

Vitamin a day can be harder to take than it sounds

U.S. Astronaut Andy Thomas and his Mir 25 crew mates spent the last two weeks unloading shipments of food, water and supplies to the Russian space station and prepared for a series of space walks in the month of April.

Thomas, who passed the midway mark of his four-month research flight as the final U.S. astronaut to live and work on the outpost, said in a televised interview that he's adjusted to his new environment but that living without gravity is a continual challenge.

"You have to learn to change the way you live and what your expectations of your day-to-day life are, because you don't have access to the normal recreational kinds of activities that you might have on the ground. And you don't have access to all your social networks and people. So you change the way you live to accommodate that," Thomas said, then related one humorous incident.

"I take a vitamin every day, just as a multi-vitamin supplement," he explained. "I opened the vitamins, and of course I just had a cloud

of vitamin pills well up in front of me. You can imagine the sort of Three Stooges-type view of trying to grab them out of space and get them back in the bottle. And as quickly as I'd get them in, more would come out. That's one of the things about learning to live and function in zero gravity. The rules are all different."

A new Progress resupply ship docked with Mir on March 16, two days after its launch from the Baikonur Cosmodrome in Kazakhstan. As it headed for Mir, Commander Talgat Musabayev and Flight Engineer Nikolai Budarin jettisoned the old Progress ship from the Kvant-1 module's docking port to free it up for the arrival of the new Progress.

"It was seamless, beautiful piece of work," Thomas reported. "The docking was very smooth. We felt a slight nudge and a shudder in the station as the docking took place and as

the systems latched together. The commander executed the work flawlessly."

Once the new Progress was in place, the three crew members began to unload its contents and geared up for the first of three planned excursions outside Mir by Musabayev and Budarin to replace the fuel supply in a boom assembly rising from Kvant-1 called the Sofora tower. It has been used since 1987 to provide some attitude control for the Mir, but with its fuel supply dwindling, Russian flight controllers elected to replenish the fuel and perform other maintenance work on the boom itself.

The first space walk associated with the boom assembly tasks is scheduled for April 1. Around April 20, Musabayev and Budarin will conduct another space walk to strengthen the damaged solar array mast on the Spektr module that bore the brunt of the collision between a Progress vehicle and the Mir last



NASA works on satellite to view Earth

Keying off a concept proposed by Vice President Al Gore, NASA is developing plans for a small satellite that could provide continuous views of the Earth by the year 2000.

NASA plans to issue educational, scientific and possibly commercial announcements of opportunity within the next few weeks, following the Vice President's call March 13 for NASA to design, build and launch the satellite by 2000.

"Vice President Gore has given us an exciting challenge," said NASA Administrator Daniel S. Goldin. "In the coming weeks, we plan to solicit ideas from the academic, environmental, scientific and commercial communities. We will synthesize these ideas and communicate with the Congress as we go forward."

Goldin said NASA envisions "down-to-Earth" applications: "This view of our planet can help us plan as fires ravage wilderness areas, it may be able to save lives as we watch hurricanes and typhoons form and threaten coastlines across the grand sweep of ocean basins. Moreover, we think it is important to inspire young minds, provide new perspectives on the planet for our scientific community, and perhaps provide commercial applications as well. We're going to pave the way for an Earth Channel."

The satellite concept would place a high definition television camera—paired with an eight-inch telescope—into an orbit at a unique vantage point a million miles from Earth where it could provide 24-hour views of the home planet. It would orbit at a point in space where the gravitational attraction of the Sun and the Earth essentially cancel one another, allowing the satellite to constantly view a fully sunlit hemisphere.

Early plans envision a 330-pound satellite linked to Earth through three simple, low-cost ground stations equally spaced around the globe to provide continuous downlink capability. One new image would be downlinked every few minutes. Total cost would not exceed \$50 million.

New Global Surveyor data reveal genesis of Martian dust storm

For the first time in Mars exploration, a spacecraft has captured the full evolution of a Martian dust storm.

NASA's Mars Global Surveyor also has returned new insights into the deeply layered terrain and mineral composition of the Martian surface, and to highly magnetized crustal features that provide important clues about the planet's interior.

These findings are among the early results from the Mars-orbiting mission being reported in the March 13 issue of Science magazine.

This first set of formal results comes from data obtained in October and November 1997, while the spacecraft was just beginning to use the drag of Mars' upper atmosphere to lower and circularize its highly



The Space Shuttle *Columbia* is transferred from Orbiter Processing Facility Bay 3 to the Vehicle Assembly Building, where it was be mated to its external tank and solid rocket boosters last week. *Columbia* is being prepared for the STS-90 mission, carrying the Neurolab payload.

Columbia rolls to launch pad

By Ed Campion

Following rollout to Launch Pad 39B earlier this week, final vehicle and payload operations are under way for the launch of *Columbia* on the STS-90 Neurolab mission.

Columbia's arrival at the launch pad followed its transfer from the Orbiter Processing Facility to the Vehicle Assembly Building on March 16 where it was mated to its solid rocket booster/external tank set.

During the removal of the orbiter sling following hardmate of *Columbia* to it's external tank, the aft sling contacted the orbiter near the left aft attach point and slightly scuffed the thermal blanket material in that area. Technicians removed some blankets and tiles in order to inspect the subsurface area and found no structural damage.

Shuttle interface testing then resumed and the scuffed blanket area was removed and replaced with new material. The extra inspection work did not significantly affect VAB operations and *Columbia* was able to rollout as scheduled.

Early next week, STS-90 Commander Rick Searfoss, Pilot Scott Altman, Mission Specialists Rick Linnehan, Kay Hire and Dave Williams and Payload Specialists Jay Buckley and James Pawelczyk will be at Kennedy Space Center to participate in the Terminal Countdown Demonstration Test.

Launch remains targeted for the opening of a 2 1/2-hour window at 1:19 p.m. CDT April 16.

The Neurolab mission will examine the effects of space flight and microgravity on the neurological system, including the brain, spinal cord, peripheral nerves and sensory organs in the human body. The goals of the flight are to conduct basic research in the neurosciences and to increase understanding of neurological and behavioral changes in space.

The planned mission duration is 16 days but mission managers will keep open an option to extend the flight one day if power margins permit. *Columbia* is scheduled to return to KSC on May 2, or May 3 if the extension day is given, about 10:17 a.m. CDT.

Meanwhile, processing of *Discovery* for STS-91, the final shuttle-Mir mission, continues in Orbiter Processing Facility bay 2 at KSC. The Crew Equipment Interface Test is set for this weekend and the completion of main engine installation early next week. STS-91 remains targeted for a launch at 7:05 p.m. CDT May 28.

In OPF bay 1, work to prepare *Endeavour* for the first shuttle station assembly flight continues. STS-88 is marked for a July 9 launch but that date is under review by shuttle managers.



NASA completes assembly of new X-ray telescope

Assembly of the world's most powerful X-ray telescope, NASA's Advanced X-ray Astrophysics Facility, was completed last week with the installation of its power-generating twin solar panels. AXAF is scheduled for launch aboard STS-93 in December.

The last major components of the observatory were bolted and pinned into place March 4 at TRW Space and Electronics Group in Redondo Beach, Calif., and pre-launch testing of the fully assembled observatory began March 7.

"Completion of the observatory's assembly process is a big step forward toward launch scheduled for the end of this year," said Fred Wojtalik, manager of the Observatory Projects Office at Marshall Space Flight Center. "With all the major components in place, we are now concentrating on a thorough pre-launch checkout of the observatory."

"We're delighted to reach this major milestone for the program," said Craig Staresinich, TRW's Advanced X-ray Astrophysics Facility program manager. "The entire observatory team has worked hard to get to this point and will continue an exhaustive test program to ensure mission success. We're looking forward to delivering a truly magnificent new space capability to NASA later this summer."

The first pre-launch test of the Advanced X-ray Astrophysics Facility was an acoustic test, which simulated the sound pressure environment inside the space shuttle cargo bay during launch.

A thorough electrical checkout before and after the acoustic test verifies that the observatory and its science instruments can withstand the extreme sound levels and vibrations that accompany launch.

"With 10 times the resolution and 50-100 times the sensitivity of any previous X-ray telescope, this observatory will provide us with a new perspective of our universe," said the project's chief scientist, Dr. Martin Weisskopf, of Marshall. "We'll be able to study sources of X-rays throughout the universe, like colliding galaxies and black holes, many of which are invisible to us now. We may even see the processes that create the elements found here on Earth."

Assembly of the observatory began in 1997 with the arrival of the high resolution mirror assembly at TRW Space and Electronics Group.

In August 1997, the telescope's optical bench was mated with the mirrors, followed by integration of the telescope with the spacecraft in October. In February 1998, the observatory's science instrument module was mated to the top of the telescope. The complete observatory is 45 feet long, has a solar array wing span 64 feet wide, and weighs more than 5 tons.

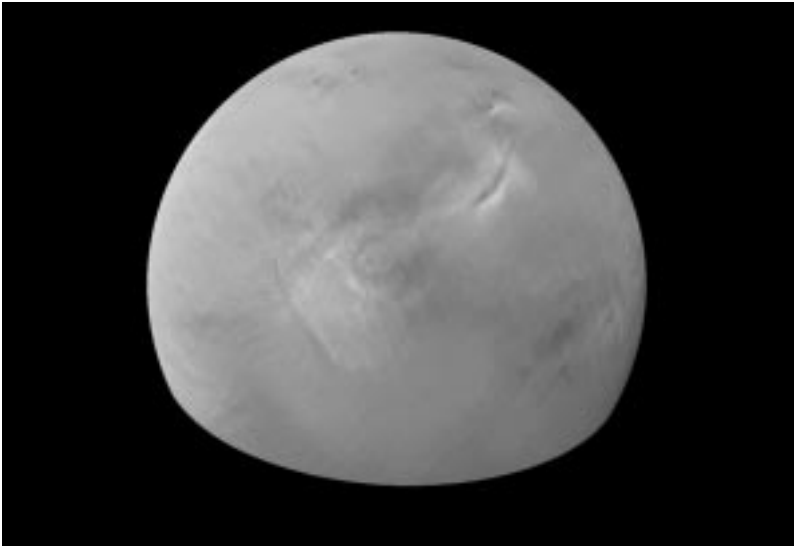
The Advanced X-ray Astrophysics Facility program is managed by Marshall for the Office of Space Science, NASA Headquarters. The Smithsonian Astrophysical Observatory in Cambridge, Mass., will operate the observatory for NASA.

Mars Pathfinder declared defunct

The Mars Pathfinder team officially declared the spacecraft defunct at 3:21 p.m. JSC time March 10.

Using the high efficiency 34 meter Deep Space Network antenna located in Goldstone, Calif., the team made one last attempt to contact the highly successful probe beginning at 12:51 p.m. The team tried to activate an onboard sequence designed to turn on the primary Pathfinder transmitter. Scientists had to wait for 40 minutes before a response from Pathfinder could be expected.

After an hour, scientists began a 50 minute sweep signal with a command to turn on the primary transmitter on Pathfinder. During this final 40-minute waiting period no contact was heard.



This image was taken by the Global Surveyor spacecraft during the 1997 Martian dust storm. The storm covered an area about the size of the Atlantic Ocean.